Exemption No. 6889

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
RENTON, WASHINGTON 98055-4056

In the matter of the petition of

Boeing Commercial Airplane Group

for an exemption from § 25.1435(b)(1) of Title 14, Code of Federal Aviation Regulations

Regulatory Docket No. 29427

GRANT OF EXEMPTION

By letter of December 11, 1998, Mr. Norman I. Lee, III, Manager, Certification Programs, Boeing Commercial Airplane Group, P.O. Box 3707, Seattle, WA, 98124-2207, petitioned for a partial exemption from the static pressure test requirements of § 25.1435(b)(1) of Title 14, Code of Federal Aviation Regulations (14 CFR). The proposed exemption, if granted, would permit a range of motion test to be conducted at 3400 psig for only the hydraulic tubing added to Boeing Model 737-700 for the operation of the Main Deck Cargo Door (MDCD) on new model derivative 737-700 convertible airplanes.

The petitioner requests relief from the following regulations:

> **Section 25.1435(b)(1)** states that a complete hydraulic system must be static tested to show that it can withstand 1.5 times the design operating pressure without a deformation of any part of the system that would prevent it from performing its intended function. Clearance between structural members and hydraulic system elements must be adequate, and there must be no permanent detrimental deformation. For the purpose of this test, the pressure relief valve may be made inoperable to permit application of the required pressure.

ANM-99-101-E

Related Section of the Federal Aviation Regulations (FAR):

Section 25.1435(a)(2) states that each element of the hydraulic system must be able to withstand, without rupture, the design operating pressure loads multiplied by a factor of 1.5, in combination with ultimate structural loads that can reasonably occur simultaneously. Design operating pressure is maximum normal operating pressure, excluding transient pressure.

The petitioner's supportive information is as follows:

"In lieu of a static test, Boeing proposes to demonstrate compliance with FAR 25.1435(b)(1) with a range-of-motion test for only the hydraulic tubing added for the 737-700C MDCD system at just below the system relief pressure of 3,400 psig. Except for the changes required for the MDCD, the remainder of the 737-700C hydraulic distribution system is identical to the 737-700 which complies with FAR 25.1435(b(l).

"The actuation and control components required for the MDCD were previously certified for use on the 737-200C/-200F/-300F/-300QC and 757-200PC/-200PF and were shown to meet FAR 25.1435 (b)(1) *(*4,500 psig) in their individual Qualification Test documents. The main deck cargo door assembly will be static pressure tested (to 4,500 psig) to demonstrate compliance with FAR 25.1435 (b)(1). The specific compliance approach for the 737-700C will be defined in the 737-700C hydraulic power system certification plan.

"Granting of this exemption is in the public interest because Boeing's proposed method of demonstrating compliance will enhance the current level of safety by identification of additional dynamic interference problems. The applicant presents the following factors which substantiate that this Petition for Exemption provides for an equal or greater level of safety as well as eliminates inefficiencies and added cost.

"1) The purpose of the test is to check a complete hydraulic system and show adequate separation between the hydraulic system elements and adjacent elements, including structure, such that there will be no permanent detrimental deformation that would prevent the hydraulic system from performing its intended function. If the test were to be performed at 4,500 psig, many components would have to be disconnected or blocked off from the 4,500 psig pressure source to prevent pressure relief to return or structural overload.

"The deactivation of many components would render the hydraulic system out of configuration. Also, if the test were to be performed at 4,500 psig, it would be a static test. A test at 3,400 psig allows for verifying hydraulic system element separation during normal actuation and is in compliance with the proposed requirement of NPRM 96-6, issued July 3, 1996, which states:

'The complete hydraulic system(s) must be functionally tested on the airplane in normal operation over the range of motion of all associated user systems. The test must be conducted at the system relief pressure [or] 1.25 times DOP if a system pressure relief device is not part of the system design. Clearances between hydraulic system elements and other systems or structural elements must remain adequate and there must be no detrimental effects.'

"2) Tubing deflections due to pressurization are minimal and the differences in deflections when pressurized to 3,400 psig versus 4,500 are negligible.

"Conclusion:

"The proposed test evaluates deflections through the full range of motion of the main deck cargo door and is conducted on an operational system. In addition, the proposed exemption has been approved in similar instances (777-200 Exemption No. 5758; 737-700 Exemption No. 6086; 777-300 Exemption No. 6504; and 757-300 Exemption No. 6577) and was endorsed by the FAA in NPRM 96-6 of July 3, 1996. In view of the substantiating factors detailed above, Boeing asserts that the method of compliance proposed for pressure testing of the 737-700C MDCD system provides, in the public interest, greater assurance of safe operation and hereby petitions the FAA to grant the subject exemption.

A summary of the petition was published in the Federal Register on January 14, 1999 (64 FR 2532). No comments were received.

The Federal Aviation Administration's analysis/summary is as follows:

The FAA has carefully considered the information provided by the petitioner, and has determined that there is sufficient merit to warrant a grant of partial exemption.

Purpose of § 25.1435(b)(1).

The FAA concurs that the purpose of § 25.1435(b)(1) is as stated by the applicant.

Proposed Test Method.

The FAA concedes that the proposed dynamic test (with nothing disabled) may be a better test than the required static test, and that it may meet the intent of the rule at an acceptable level of safety, provided it is run at or near the relief valve setting (3400 psig), and in combination with the component qualification tests.

Previously Granted Exemptions

The FAA concurs that the proposed exemption has been approved in several similar instances, e.g., Boeing 777-200, 737-700, 777-300, and 757-300.

In consideration of the foregoing, I find that a grant of exemption is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. §§ 40113 and 44701, delegated to me by the Administrator (14 CFR § 11.53), the Boeing Commercial Airplane Group is hereby granted a partial exemption from 14 CFR § 25.1435(b)(1) to the extent necessary to permit type certification of the Model 737-700C by testing of only the hydraulic tubing added for the 737-700C MDCD system at just below 3400 psig, the system relief pressure. All test results pertinent to this exemption must be documented in a report with a copy provided to this office.

Issued in Renton, Washington, on April 15, 1999.

/s/ John J. Hickey
John J. Hickey
Acting Manager
Transport Airplane Directorate
Aircraft Certification Service, ANM-100